

Greater Yellowstone Network Rocky Mountain Network RESOURCE BRIEF

National Park Service
U.S. Department of the Interior
Intermountain Region
Inventory & Monitoring Program



Climate in Bighorn Canyon National Recreation Area and Little Bighorn Battlefield National Monument

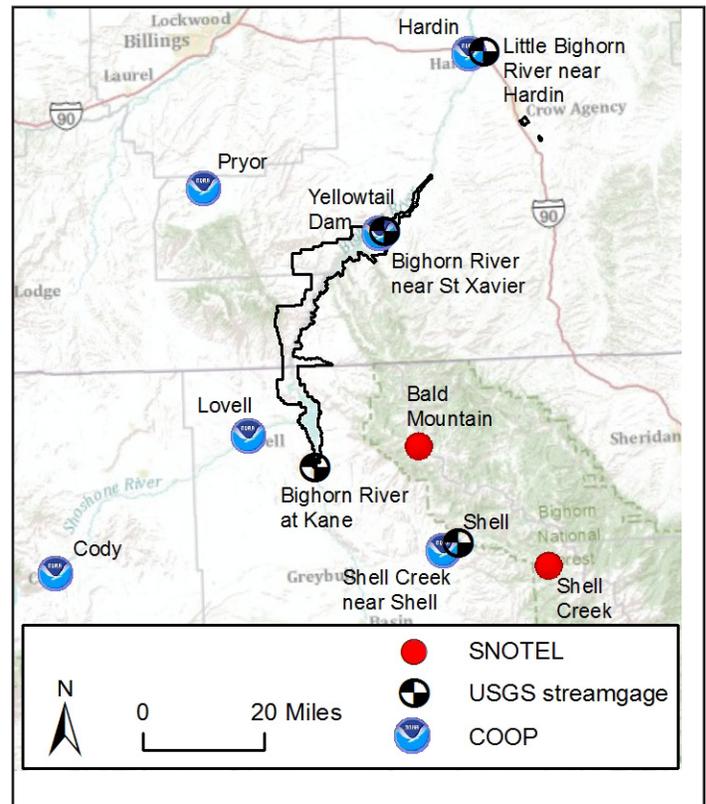
This brief summarizes climate data for 2010 from multiple climate stations in or near Bighorn Canyon National Recreation Area and Little Bighorn Battlefield National Monument following procedures from the Rocky Mountain Climate protocol. Climate data describe precipitation, temperature, streamflow, and snowpack compared primarily to a standard 30-year climatological reference or “normal” period (currently 1971–2000), which is considered “average.”

2010 Climate at a Glance

- Total annual precipitation ranged between 81% and 141% of average.
- Average annual maximum daily temperatures ranged between 1°F and 5°F cooler than average. Average annual minimum daily temperatures were near average.
- The onset of spring and fall was one to three weeks later than average, depending on station.
- Snow water equivalent (SWE) was below average at both Bald Mountain and Shell Creek. The timing of maximum SWE was near normal and was reached in June. Melt out dates were near normal.
- Above average precipitation in May and June and rapid snowmelt led to higher than average peak flows on the Little Bighorn River near Hardin and the Bighorn River near Kane.
- Total annual runoff on the Little Bighorn River near Hardin MT was 96% of average; annual runoff on the Bighorn River near St. Xavier and Kane was 113% and 115% of average.

Temperature

During 2010, annual average minimum and maximum daily temperatures were within 1°F of average at Hardin, Lovell, and Shell 1 NE, but 5°F cooler than average at Yellowtail Dam. Monthly average maximum and average minimum daily temperatures highlight the differences and similarities at each weather station in the region. Of note is the cooler than average maximum temperatures recorded during spring and summer. Daily maximum temperatures started out



Map of SNOTEL and COOP stations and USGS stream gauges for Bighorn Canyon National Recreation Area and Little Bighorn Battlefield National Monument.

warmer than average in March and then changed to cooler than average at most stations in April. By May, maximum daily temperatures were 5–11°F below average. Average maximum temperatures stayed below average at Yellowtail Dam, Hardin, and Lovell until September. October was unseasonably warm across the region with Lovell, Hardin, and Shell 1 NE experiencing maximum daily temperatures 5–6°F warmer than average.

The onset of spring is defined as the last day when the minimum temperature dropped below 28°F, and the first day of fall is defined as the first day when minimum temperatures drop below 28°F. In 2010, both spring and fall were late in arrival by one to three weeks depending on the station. The number of hot days (maximum daily temperatures at or above 90°F) was fewer than average; and the number of frosty nights (minimum daily temperatures at or below 32°F) was near average for most places, except Hardin, which had 21 fewer frosty nights than average.

Total Annual Precipitation

During 2010, individual weather stations in the Bighorn Basin reported total annual precipitation that was near average or below average, whereas weather stations in the northwestern Great Plains at Pryor and Hardin reported above average precipitation when totaled across the year. Yellowtail Dam, located on the edge of the northwestern Great Plains in Montana, normally receives 2.5 times the annual precipitation compared to Lovell, which is located in the Bighorn Basin. In 2010, Yellowtail Dam reported over 3.5 times the annual precipitation as Lovell. Also, in 2010, these locations differed in the amount of accumulated annual precipitation compared to average. Lovell reported only 81% of annual precipitation whereas Yellowtail Dam reported 108%.

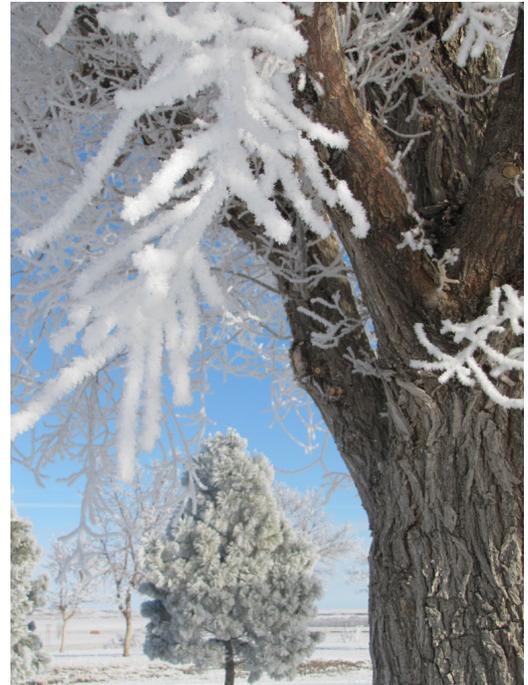
January recorded high levels of precipitation with Hardin and Pryor stations at 220-229% higher than average. Precipitation peaks in the spring in both places and the months of April-June accounted for 57% of the annual precipitation at Lovell and 60% of the annual precipitation at Yellowtail Dam. During the month of May, the Shell 1 NE station reported 270% of average and Yellowtail Dam reported 200% of average. Yellowtail Dam again reached 200% of average in August.



Red rocks at Bighorn Lake.

Streamflow

The U.S. Geological Survey monitors streamflow at key locations along the Bighorn and Little Bighorn Rivers in Montana and Wyoming. Total 2010 inflows to Bighorn Canyon and Bighorn Lake were 115% of the 1930-2010 average. Total discharge on the Bighorn River downstream from Bighorn Lake was 113% of average. The level of Bighorn Lake stayed above the NPS-recommended minimum level of 3620' throughout the year.



Frost and snow in Bighorn Canyon National Recreation Area.

Winter Snowpack

The Natural Resource Conservation Service operates automated snow measurement (SNOTEL) stations throughout the western United States. These stations offer the best available information to track accumulation and loss of snowpack, which is measured in terms of snow water equivalent (SWE), or the amount of liquid water held in a given volume of snow. Overall, the maximum SWE was 76-78% of average, depending on the location.

December 2011

Jean, C., R. Daley, M. T. Tercek, and S. T. Gray. 2011. High elevation national parks: 2010 climate summary report. Natural Resource Data Series NPS/GRYN/NRDS—2011/203. National Park Service, Fort Collins, Colorado. <https://irma.nps.gov/App/Reference/Profile/2180512?code=2180512>

Rocky Mountain Climate Working Group. 2010. Rocky Mountain climate protocol: Climate monitoring in Greater Yellowstone and Rocky Mountain inventory and monitoring networks, Version 1.0. Natural Resource Report NPS/IMRO/NRR-2010/222. National Park Service, Fort Collins, Colorado. <https://irma.nps.gov/App/Reference/Profile/2124861>